WHAT IS CLAIMED IS:

1. A method of processing a semiconductor sample, comprising the steps of:

(i) etching the sample by means of a first plasma formed in a gas atmosphere, wherein said sample comprises a semiconductor substrate and overlying said semiconductor substrate a layer which is subjected to the etching of step (i), said layer being a laminate of at least two films overlying the semiconductor substrate, the at least two films comprising different metals of different ionization tendencies, said etching including etching of each of the at least two films, residual corrosive compounds being left on the sample after said etching;

(ii) after step (i), treating the sample by means of a second plasma to remove said residual corrosive compounds formed in step (i) and to remove a resist mask, said second plasma being formed in an oxygen gas atmosphere which is different from the gas atmosphere in which the first plasma is formed;

(iii) contacting a surface of said sample etched in step (i) and treated in step (ii) with at least one liquid; and

(iv) after step (iii), drying the sample.

2. A method according to claim 1, wherein said at least two films are selected from the group consisting of a film of

Al, a film of Cu, a film of refractory metal, a film of an alloy of Al, Cu or refractory metal, a film of a silicide of refractory metal, a film of TiN and a film of TiW.

3. A method according to claim 1, wherein said at least one liquid effects removal of said residual corrosive compounds, formed in step (i), not removed in step (ii).

4. A method according to claim 3, wherein said at least one liquid effects removal of a part of the resist mask not removed in step (ii).

5. A method according to claim 1, wherein said at least one liquid effects passivation of a surface of the sample etched in step (i) and treated in step (ii).

6. A method of processing a semiconductor sample, comprising the steps of:

(i) etching the sample, comprising a laminate of at least two films overlying a semiconductor substrate, the at least two films comprising different metals of different ionization tendencies, through a resist mask formed on said sample, by means of a first plasma formed in a gas atmosphere, said etching including etching of the at least two films, residual corrosive compounds from the etching being left on the sample after etching;

(ii) after step (i), transferring the sample to a location for a second plasma, and then treating the sample by

means of the second plasma to remove said residual corrosive compounds formed in step (i) and to remove said resist mask, said second plasma being formed in an oxygen gas atmosphere which is different from the gas atmosphere in which the first plasma is formed, wherein step (i), and the transferring and treating of step (ii), are performed in a vacuum; and

(iii) contacting a surface of said sample etched in step (i) and treated in step (ii) with at least one liquid, said contacting being performed after said treating the sample by means of the second plasma so as to avoid corrosion of the sample due to said residual corrosive compounds remaining on the sample after said step (ii).

7. A method according to claim 6, wherein said at least two films are selected from the group consisting of a film of Al, a film of Cu, a film of refractory metal, a film of an alloy of Al, Cu or refractory metal, a film of a silicide of refractory metal, a film of TiN and a film of TiW.

8. A method of processing a semiconductor sample having a laminate comprising at least two films of at least two different metals of different ionization tendencies overlying a semiconductor substrate, comprising the steps of:

(i) etching said semiconductor sample, including said at least two films, using a resist mask, by means of a first plasma formed in a first gas with first processing conditions, residual corrosive compounds being left on the sample after the etching,

(ii) after step (i), ashing the sample by means of a second plasma to remove at least the resist mask and said residual corrosive compounds formed in step (i), said second plasma being formed in a second gas and with second processing conditions,

(iii) contacting a surface of said sample etched in step (i) and ashed in step (ii) with at least one liquid which effects at least one of (a) removal of said residual corrosive compounds formed in step (i) which were not removed in step (ii) and (b) passivation of said surface etched in step (i) and ashed in step (ii), and

(iv) after step (iii), drying the sample.

9. A method according to claim 8, wherein step (iv) takes place in the same environment as step (iii).

10. A method according to claim 8, wherein the drying uses an inert gas.

11. A method according to claim 8, wherein step (ii) uses oxygen as part of the second gas.

12. A method according to claim 8, wherein step (iii) is carried out in an inert gas atmosphere.

13. A method according to claim 8, wherein step (iii) is carried out in an atmospheric atmosphere.

14. A method according to claim 8, wherein step (iv) is carried out in an atmospheric atmosphere.

15. A method according to claim 8, wherein step (iv) includes introducing a dry gas to the sample.

16. A method according to claim 8, wherein said at least two different metals of different ionization tendencies are selected from the group consisting of Al, Cu and refractory metals, alloys of at least one of Al, Cu and refractory metals, alloys of at least one of Al, Cu and refractory metals and also containing silicon, silicides of refractory metals, TiN and TiW.

17. A method according to claim 8, wherein step (ii) removes the whole of said resist mask.

18. A method of processing a semiconductor sample having a laminate, said laminate comprising at least two films having at least two different metals of different ionization tendencies, overlying a semiconductor substrate, comprising the steps of:

(i) etching said semiconductor sample having the laminate comprising at least two films of at least two different metals of different ionization tendencies, wherein said at least two metals are selected from the group consisting of Al, Cu, and refractory metals, alloys of at least one of Al, Cu, and refractory metals, alloys of at least

one of Al, Cu and refractory metals and also containing silicon, silicides of refractory metals, TiN and TiW, by using a resist mask, by means of a first plasma formed in a first gas with first processing conditions, each of the at least two films of the laminate being etched during said etching, residual corrosive compounds being left on the sample after said etching,

(ii) after step (i), ashing the semiconductor sample by means of a second plasma to remove at least the resist mask and said residual corrosive compounds formed in step (i), said second plasma being formed in a second gas and with second processing conditions,

(iii) contacting a surface of said sample etched in step (i) and ashed in step (ii) with at least one liquid which effects at least one of (a) removal of said residual corrosive compounds formed in step (i) which were not removed in step (ii) and (b) passivation of said surface etched in step (i) and ashed in step (ii), and

(iv) after step (iii), drying the sample.

19. A method according to claim 18, wherein step (iv) takes place in a same environment as step (iii).

20. A method according to claim 18, wherein step (iv) uses an inert gas.

21. A method according to claim 18, wherein step (ii) uses oxygen as part of the second gas.

22. A method according to claim 18, wherein step (iii) is carried out in an inert gas atmosphere.

23. A method according to claim 18, wherein step (iii) is carried out in an atmospheric atmosphere.

24. A method according to claim 18, wherein step (iv) is carried out in an atmospheric atmosphere.

25. A method according to claim 18, wherein step (iv) includes introducing a dry gas to the sample.

26. A method of processing a semiconductor sample having a laminate of at least two layers overlying a semiconductor substrate and a resist mask formed on said laminate, said at least two layers respectively being made of different materials from each other and having different ionization tendencies from each other, comprising the steps of:

(i) etching each of said at least two layers of said laminate through said resist mask, by means of a first plasma, so as to form an etched sample having an etched shape which corresponds to a pattern of said resist mask, residual corrosive compounds from the etching being left on the etched sample;

(ii) after step (i), treating the etched sample by means of a second plasma, to remove said residual corrosive compounds formed in step (i) and to remove said resist mask; and

(iii) contacting a surface of said semiconductor sample etched in step (i) and treated in step (ii) with at least one liquid to remove said residual corrosive compounds which were not removed in step (ii).

27. A method of processing a semiconductor sample having a laminate of at least two layers overlying a semiconductor substrate and a resist mask formed on said laminate, said at least two layers respectively being made of different materials from each other and having different ionization tendencies from each other, comprising the steps of:

(i) etching each of said at least two layers of said laminate through said resist mask, by means of a first plasma, so as to form an etched sample having an etched shape which corresponds to a pattern of said resist mask, residual corrosive compounds from the etching being left on the etched sample;

(ii) after step (i), treating the etched sample by means of a second plasma, to remove said residual corrosive compounds formed in step (i) and to remove said resist mask;

(iii) contacting a surface of said semiconductor sample etched in step (i) and treated in step (ii) with at least one liquid, to remove said residual corrosive compounds which were not removed in step (ii); and

(iv) after step (iii), drying the semiconductor sample.

28. A method of processing a sample having a laminate of at least two layers on a substrate and a resist mask formed on

said laminate, said laminates including at least a first layer and a second layer, the first layer being made of a material selected from the group consisting of TiW, TiN and W, and the second layer being made of an Al alloy, comprising the steps of:

(i) etching each of said first layer and said second layer through said resist mask, by a first plasma formed in a first vacuum chamber, so as to form an etched sample having an etched shape which corresponds to a pattern of said resist mask, residual corrosive compounds from the etching being left on the etched sample;

(ii) after step (i), treating the etched sample by a second plasma formed in a second vacuum chamber, to remove said residual corrosive compounds formed in step (i) and to remove said resist mask; and

(iii) contacting a surface of said sample etched in step (i) and treated in step (ii) with at least one liquid, to remove said residual corrosive compounds which were not removed in step (ii).

29. A method of processing a sample having a laminate of at least two layers on a substrate and a resist mask formed on said laminate, said laminate including at least a first layer and a second layer, the first layer being made of a material selected from the group consisting of TiW, TiN and W, and the second layer being made of an Al alloy, comprising the steps of:

(i) etching each of said first layer and said second layer through said resist mask, by a first plasma formed in a first vacuum chamber, so as to form an etched sample having an etched shape which corresponds to a pattern of said resist mask, residual corrosive compounds from the etching being left on the etched sample;

(ii) after step (i), treating the etched sample by a second plasma formed in a second vacuum chamber, to remove said residual corrosive compounds formed in step (i) and to remove said resist mask;

(iii) contacting a surface of said sample etched in step (i) and treated in step (ii) with at least one liquid, to remove said residual corrosive compounds which were not removed in step (ii); and

(iv) after step (iii), drying said sample.

30. A method of processing a sample that includes a laminated member having a laminate of at least two films overlying a substrate, the at least two films comprising different metals of different ionization tendencies in different films of the at least two films, comprising the steps of:

(i) etching the sample through a resist mask formed on said laminated member in a first processing chamber by means of a first gas plasma so as to etch each of the at least two films comprising different metals of different ionization tendencies, residual corrosive compounds being left on the sample after said etching;

(ii) treating the sample in a second processing chamber by means of a second gas plasma, to remove said resist mask and said residual corrosive compounds which are adhered to a side wall of said laminate, including the different metals of different ionization tendencies, formed in said step (i); and

(iii) contacting a surface of the sample exposed by said step (i) and treated in said step (ii) with at least one liquid, to remove a remainder of said residual corrosive compounds which were adhered to said side wall of said laminate and were not removed in said step (ii).

31. A method of processing a sample according to claim 30, wherein the laminate includes an Al alloy film and a film of a material selected from the group consisting of TiW, TiN and W, and wherein in said step (i) each film of the laminate is etched using a gas plasma including chlorine under a vacuum through said resist mask;

in said step (ii), the sample is ashed using a gas plasma including an oxygen-containing gas; and

in said step (iii), the sample is cleaned by contacting with water.

32. A method of processing a sample according to claim 30, wherein to remove said remainder of said residual corrosive compounds formed in said step (i), said step (iii) comprises cleaning with water.

33. A method of processing a sample according to claim 32, wherein said step (iii) further includes cleaning with an alkali liquid prior to cleaning with water.

34. A method of processing a sample according to claim 32, wherein said step (iii) further includes cleaning with an acidic liquid prior to cleaning with water.

35. A method of processing a sample according to claim 32, wherein said step (iii) further includes cleaning with a fluoric acid-nitric acid mixture prior to cleaning with water.

36. A method of processing a sample according to claim 30, wherein said laminate is constituted by a plurality of films made of materials selected from the group consisting of a high melting point metal selected from the group consisting of Al, Cu, W, Ti and Mo, an alloy of said high melting point metal, a silicide of said high melting point metal, TiN and TiW.

37. A method of processing a sample, comprising the steps of:

(i) etching a sample, having a laminated member including a laminate of an Al alloy film and a high melting point metal film overlying a substrate, through a resist mask, using a gas plasma for said etching, said etching including etching said Al alloy film and said high melting point metal

film of the laminated member, residual corrosive compounds being left on the sample after said etching;

(ii) after said step (i), treating the etched sample by means of a post-treatment gas plasma different from said gas plasma for etching in said step (i), to remove said resist mask and said residual corrosive compounds which are adhered to a side wall of said laminated member;

(iii) rinsing the sample treated in said step (ii), to remove said residual corrosive compounds which were adhered to said side wall of said laminated member and were not removed in said step (ii); and

(iv) drying the sample rinsed in said step (iii).

38. A method of processing a sample according to claim 37, wherein said rinsing step (iii) comprises at least one step of cleaning with water.

39. A method of processing a sample according to claim 38, wherein said step (iii) further includes cleaning with an alkali liquid prior to cleaning with water.

40. A method of processing a sample according to claim 38, wherein said step (iii) further includes cleaning with an acidic liquid prior to cleaning with water.

41. A method of processing a sample according to claim 38, wherein said step (iii) further includes cleaning with a fluoric acid-nitric acid mixture prior to cleaning with water.

42. A method of processing a sample according to claim 37, wherein said high melting point metal film is a film selected from the group consisting of a TiN film, a TiW film and a W film.

43. A method of processing a sample having laminated layers on a substrate and a resist mask formed on said laminated layers, said laminated layers respectively being formed of different metals, said different metals respectively being (1) TiW, TiN or W and (2) an Al alloy, comprising the steps of:

(i) etching said sample through said resist mask, by a first plasma formed in a first vacuum chamber, said etching including etching of each of said laminated layers, residual corrosive materials being left on the sample after the etching;

(ii) after step (i), treating the sample by a second plasma in a second vacuum chamber, to remove said residual corrosive compounds formed in step (i) and to remove said resist mask;

(iii) contacting a surface of said sample etched in step (i) and treated in step (ii) with at least one liquid, to remove a remainder of said residual corrosive compounds which were not removed in step (ii); and

(iv) after step (iii) drying said sample.

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